

NASA TECH BRIEF

Lewis Research Center



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DESIGN CRITERIA MONOGRAPH ON TURBOPUMP INDUCERS

A design criteria monograph has been published which is a summary and a systematic ordering of the large and loosely organized body of existing successful design techniques and practices for liquid rocket engine turbopump inducers.

This monograph was written to organize and present, for effective use in design, the significant experience and knowledge accumulated by NASA in development and operational programs. It reviews and assesses current design practices, and from them establishes firm guidance for achieving greater consistency in design, increased reliability in the end product, and greater efficiency in the design effort.

The design philosophy in the monograph is to seek an optimization of the hydrodynamic parameters of inducers to obtain the highest suction specific speed possible without violating structural and mechanical design constraints. By use of the approach presented, the inducer designer can achieve the most effective combination of hydrodynamic and mechanical factors essential to successful design.

The successful development of liquid rocket engine turbopump inducers presented many problems. Many of the problems encountered are comparable to those found in the design and fabrication of commercial inducers and thus the techniques described in the monograph may be of value in solving these problems.

The monograph comprises two major sections: State of the Art, and Design Criteria and Recommended Practices. References complement the text.

The State of the Art section reviews and discusses the total design problem, and identifies the design elements that are involved in successful design. The Design Criteria state clearly and briefly each rule, guide, limitation, or standard that must be imposed on each essential design element to ensure successful design; the Recommended Practices set forth the best available procedures for satisfying the Design Criteria.

Both major sections are divided into eight subject categories: head rise capability, inducer inlet-eye and leading-edge geometry, inducer flow-channel and blade

geometry, inducer inlet line configuration, mechanical design and assembly, material selection, vibration considerations, and structural considerations.

This thorough review of design criteria relating to turbopump inducers should be of interest to turbomachinery designers and manufacturers in general and to pump designers and manufacturers in particular.

NOTES:

1. The following documentation may be obtained from:
National Technical Information Service
Springfield, Virginia 22151
Single document price \$3.00
(or microfiche \$0.95)
Reference: NASA SP-8052 (N71-34950), Liquid Rocket Engine Turbopump Inducers
2. Technical questions may be directed to:
Technology Utilization Officer
Lewis Research Center
21000 Brookpark Road
Cleveland, Ohio 44135
Reference: B72-10635

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